CLAIMS

1. A magnetic memory comprising:

a substrate;

a lower portion structure provided on an upside of said substrate as a portion of a magnetic element;

an upper portion structure provided on an upside of said lower portion structure of said magnetic element; and

a sidewall insulating film provided to surround said upper portion structure of said magnetic element.

2. The magnetic memory according to claim 1, wherein said magnetic element has a size of an outer circumference of said sidewall insulating film.

3. The magnetic memory according to claim 1 or 2, wherein said lower portion structure of said magnetic element comprises:

a conductive portion; and

a first magnetic film provided on an upside of said conductive portion, and

said upper portion structure of said magnetic element comprises:

an insulating film;

a second magnetic film provided on an upside

of said insulating film.

4. The magnetic memory according to claim 1 or 2, wherein said lower portion structure of said magnetic element comprises a conductive portion, and

said upper portion structure of said magnetic element comprises:

a first magnetic film;

an insulating film formed on an upside of said first magnetic film; and

a second magnetic film provided on an upside of said insulating film.

5. The magnetic memory according to claim 3 or 4, wherein said upper portion structure of said magnetic element further comprise:

a conductive film formed on an upside of said second magnetic film.

6. The magnetic memory according to any of claims 1 to 5, wherein a plane shape of said upper portion structure of said magnetic element is any one of an oval, a cycloid, a rectangle, a hexagon, and a corner quadrangle.

7. The magnetic memory according to any of claims 1 to 6, wherein a distance d on a plane between

an outer circumference of an upper surface of said lower portion structure of said magnetic element and an outer circumference of an upper surface of said upper portion structure of said magnetic element has a relation of $0.01\ m \leq d \leq 0.2\ m$.

8. The magnetic memory according to any of claims 1 to 7, further comprising:

an interlayer insulating film formed to cover said lower portion structure of said magnetic element, said sidewall insulating film, and said upper portion structure of said magnetic element,

said interlayer insulating film has a via-hole on an upside of said upper portion structure of said magnetic element, and

said sidewall insulating film is formed of a material which has an etching selection ratio smaller than said interlayer insulating film.

9. The magnetic memory according to any of claims 1 to 7, further comprising:

an interlayer insulating film formed to cover said lower portion structure of said magnetic element and said sidewall insulating film, and

said sidewall insulating film is formed of a material which has a selection ratio in a chemical mechanical polishing or an etching-back smaller than

said interlayer insulating film.

10. The magnetic memory according to any of claims 1 to 9, wherein said sidewall insulating film is formed of at least one of metal nitride, metal oxide, and metal carbide.

11. The magnetic memory according to any of claims 1 to 10, wherein said sidewall insulating film comprises at least one of silicon oxide, silicon nitride, aluminum oxide, and aluminum nitride.

12. A method of manufacturing a magnetic memory comprising:

forming a multi-layer film included in a magnetic element on an upside of a substrate;

etching said multi-layer film into a predetermined pattern up to a predetermined depth, to form an upper portion structure of said magnetic element;

forming a sidewall insulating film to surround said upper portion structure of said magnetic element;

etching said multi-layer film by using said sidewall insulting film and said upper portion structure of said magnetic element as a mask to form a lower portion structure of said magnetic element as a

remaining portion of said magnetic element.

13. The method according to claim 12, wherein said lower portion structure of said magnetic element includes a conductive portion and a first magnetic layer formed on an upside of said conductive portion, and

said upper portion structure of said magnetic element comprises an insulting layer and a second magnetic layer formed on an upside of said insulating layer.

14. The method according to claim 12 or 13, wherein said etching said multi-layer film into a predetermined pattern, comprises:

etching said multi-layer film into said predetermined pattern by using a physical etching.

15. The method according to claim 14, wherein said physical etching is ion milling.

16. The method according to any of claims 12 to 15, wherein said lower portion structure of said magnetic element comprises a conductive portion, and

said upper portion structure of said magnetic element comprises:

a first magnetic layer;

an insulating layer formed on an upside of said first magnetic layer; and

a second magnetic layer formed on an upside of said insulating layer.

17. The method according to claim 16, wherein said etching said multi-layer film is carried out by using a physical and chemical etching.

18. The method according to claim 16, wherein said physical and chemical etching is a reactive ion etching.

19. The method according to any of claims 12 to 18, further comprising:

forming an interlayer insulating film to cover said lower portion structure of said magnetic element, said sidewall insulating film, and said upper portion structure of said magnetic element; and

forming a via-hole in said interlayer insulating film on an upside of said upper portion structure of said magnetic element by an etching method,

said sidewall insulating film is formed of a material which has an etching selection ratio smaller than said interlayer insulating film.

20. The method according to any of claims 12 to 19, further comprising:

forming an interlayer insulating film to cover said lower portion structure of said magnetic element, said sidewall insulating film, and said upper portion structure of said magnetic element; and

flattening said interlayer insulating film on an upside of said upper portion structure of said magnetic element by a chemical mechanical polishing method or an etching-back method,

said sidewall insulating film is formed of a material which has a selection ratio in the chemical mechanical polishing method or the etching-back method smaller than said interlayer insulating film.